

IN THE DRAWINGS:

Please substitute the attached Replacement Sheet(s) for its(their) corresponding drawing sheet(s) in this Application.

REMARKS

Favorable reconsideration of this application is requested in view of the foregoing amendments and the following remarks. Claims 1, 4, 6-12, 14-19, 33-46, 49, 51-59, 61-66 and 68-74 are pending in the application. Claims 2-3, 5, 13, 20-32, 47-48, 50, 60 and 67 were previously cancelled without prejudice or disclaimer.

The claims are amended in order to more clearly define the invention, support for which is found in the figures and related parts of the specification. Specifically, literal support for the recitation in claims 1, 15, 34, 49, 62 and 73 that each bit is represented by chip transmissions at multiple frequencies is found in paragraph 0035 of the application as originally filed. Support for reciting the steps of frequency hopping a carrier signal; and direct sequence modulating the carrier signal to produce a hybrid spread spectrum signal is found in the last two paragraphs of claim 33 itself as originally filed. Support for the recitation in claim 33 of an orthogonal polarization is found in paragraph 0051 and claims 10, 57 of the application as originally filed. Support for the recitation in claim 33 of "splitting the hybrid spread spectrum signal into two identical components; and modulating an amplitude of at least one of the two identical components, wherein each component feeds a separate antenna" is found in paragraph 0071 (lines 18-22) and figures 11-12 as originally filed. Claim 37 is amended to provide antecedent and, therefore, this is not a narrowing amendment. A period has been inserted at the end of claim 73 and, therefore, this is not a narrowing amendment.

The drawings are amended to correct minor errors. Specifically, in Fig. 3, the spelling of RF synthesizer has been corrected. In Fig. 12, detail numbers 1250 and 1252 have been inserted. Support for the insertion of detail numbers 1250 and 1252 is found at paragraph 0072

(e.g., line 10) of the specification as originally filed. Applicant requests that the Examiner approve the substitute formal drawings.

Claims 12, 14, 59, 61 and 70-71 were objected to because of informalities. Claims 12, 59 and 70 are amended as suggested by the examiner. Claims 14, 61 and 71 are amended to specify an electronic storage medium.

Accordingly, withdrawal of this objection is respectfully requested.

Claims 15-19, 37-44, 46, 62-66 and 73-74 stand rejected under 35 USC 102(b) as anticipated by Kostreski et al (US 6,005,605). Independent claims 1, 15, 49 and 62 have been amended to clarify that the limitation of multiple frequency hops occurring within a single data-bit time means that each bit is represented by chip transmissions at multiple frequencies.

Kostreski, et al. (U. S. Patent No. 6,005,605), contrary to the Examiner's assertion (Office Action of 06/28/2006, ¶4) does **not** teach "generating a spread spectrum signal using a pseudorandom code generator to control a fast frequency hopping synthesizer". Although Kostreski mentions the existence of fast frequency hopping *per se* (¶12, lines 58-67 and ¶13, lines 1-3), he at no point teaches the use of fast frequency hopping in combination with his system. In fact, the use of FFH would be detrimental to the Kostreski system, due to the much higher resulting cost and complexity of the customers' receiving hardware, as well as the reduced bandwidth efficiency. Further, Kostreski **at no time** discloses any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention.

Kostreski discloses a robust television distribution system and bandwidth-efficient multiple-access method which employs time-division multiplexed, packetized slow frequency hopping of nonspread, multilevel (e.g., 64-QAM) data modulation of digitized video information

(¶12, lines 4-18). Kostreski also discloses redundant-path transmissions to provide robust service to users blocked by terrain or obstacles from the primary distribution transmitter.

Textbook definitions of direct-sequence (DS), frequency hopping (FH), time hopping (TH), time-frequency hopping (TH-FH), and chirp spread-spectrum modulations are recited (¶12, lines 26-42). Further definitions of code-division multiple access (CDMA), slow frequency hopping (SFH) and fast frequency hopping (FFH) CDMA systems are also recited (¶12, lines 58-67 and ¶13, lines 1-3). The system of choice for Kostreski is SFH-CDMA, as described in his ¶13, lines 4-27. For his application, he uses the described MPEG-II digital video encoding standard, with a packet length of 188 bytes (¶9, lines 54-67 and ¶10, lines 1-23). Using the parameters of Kostreski, one-half second of video requires 3 Mbits, or 4000 MPEG-II transport packets. Clearly, this is **slow** frequency hopping (many bits per hop); the example hop time is roughly 2 μ s, which for the composite 27 Mb/s stream is also clearly indicative of **slow** hopping (again, many bits per hop).

In addition, Kostreski in no way discloses or even hints at combining DSSS with any form of hopping, since to do so would vastly exceed the available bandwidth for his video distribution system in the Multi-channel Multi-point Distribution Service [MMDS](¶2, lines 9-23). Kostreski in fact is employing a very slow multiplexed hopping format to provide frequency diversity in his system, which with the spatial diversity of using different paths from the multiple transmitters to a given user's receiver, provides adequately robust service to all users, especially those at locations overlapped by different primary transmitters. In short, Kostreski **at no time** discloses any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention.

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1, 6-8, 12, 14 and 51 stand rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937). As noted above, Kostreski **at no time** discloses any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Clark does not obviate this deficiency of Kostreski.

Clark, et al. (U. S. Patent Publication No. 2002/0168937) contrary to the Examiner's argument (Office Action, ¶5) does **not** disclose "combining frequency hopping spread spectrum and direct sequence spread spectrum to facilitate communication with or among a plurality of nodes". Clark **at no time** discloses or teaches any specific hybrid spread-spectrum (HSS) transmission techniques [i.e., integrally combining DS and FH modulations] at all, much less the synergistic DS/FFH technique of the instant invention. Further, DS is specifically called out in Clark (his ¶0010 and ¶0029) as an **alternative** to frequency hopping, **not** in combination, as in the instant case.

In general, Clark discloses a wireless communications system tailored for industrial welding-cell production environments. Slow frequency-hopping (SFH) spread-spectrum communications links (e.g., commercial Bluetooth, ConnexRF, etc.) are utilized to improve remote monitoring and control, engineering optimization of the welding process parameters, and better service and maintenance of the usually hard-to-access welding station hardware. SFH is used to improve the RF communications reliability in the electromagnetically noisy (e.g., broadband RF interference due to the welding arcs plus other in-band RF signals) industrial environment. Clark does not at any point disclose fast frequency hopping (FFH), but only slow hopping (e.g., Bluetooth) to improve the noise immunity and offer low cost (¶0010). His mention

of DSSS is simply reciting a possible "frequency adjusting" **alternative** to FHSS as the link modulation protocol (§§0010 and §§0029). Multipath effects (and any specific techniques to address same) are never mentioned in Clark, nor at any time does he mention FFH or (obviously, then) suggest combining any form of **fast** hopping with DSSS. In summary, Clark at no time discloses any specific hybrid spread-spectrum (HSS) transmission techniques [i.e., integrally combining DS and FH modulations] at all, much less the synergistic DS/FFH technique of the instant invention.

Accordingly, withdrawal of this rejection is respectfully requested.

Claim 4 stands rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) and further in view of Swanke (US 5,521,533). As noted above, Kostreski and/or Clark do not disclose any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Swanke does not obviate this deficiency of Kostreski/Clark.

Swanke (U. S. Patent No. 5,521,533) fails to disclose the detailed direct digital synthesizer (DDS) device implementations of the hybrid (DS/FFH, FFH/TH, or DS/FFH/TH) spread-spectrum systems as depicted in Figs. 7 and 8 of the instant case. Swanke only shows the use of a DDS in a basic frequency-hopping context, or two such devices in order to reduce the normal levels of spurious RF output signals to negligible amounts. He at no time shows any circuit implementations to achieve DSSS, TH, or amplitude control as are depicted in the instant case (in Figs. 7 and 8; text at §§0047 and §§0060- 0066). Swanke further never mentions any modulation form except basic FH, much less the specific hybrid spread-spectrum formats of the instant invention (DS/FFH and the others).

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 9-10 stand rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) and further in view of Barrett (US 5,592,177). Claim 9 has been amended to require splitting the signal into two identical components; and modulating an amplitude of at least one of the two identical components to control a polarization of the signal.

Kostreski and/or Clark do not disclose any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Barrett does not obviate this deficiency of Kostreski/Clark. Further, Barrett does not disclose or suggest the limitations of claim 9.

Barrett (U. S. Patent No. 5,592,177) actually teaches away from standard linear-polarized ("elliptical") pairs of orthogonally oriented antennas to obtain his desired helical wavefront, instead employing an intervening phase shifter (delay element) between the RF source and at least one of the two antennas. The instant invention, by contrast, uses two orthogonal antennas (see our Figure 11) which use **no** phase shifter but only a standard in-phase ("0°") signal splitter [element 1133 in the dual-polarization HSS transmitter of Fig. 11]. The corresponding receiver of the instant invention (in Fig. 12, elements 1241 [V] and 1243 [H], feeding the in-phase Combiner) uses a corresponding time-synchronous (in-phase) structure to optimally combine the two independent, linearly polarized H and V channels.

Barrett discloses methods of controlling the polarization of a transmitted radio wave using two orthogonally polarized antennas on a common axis, with an intervening phase shifter or delay element between the RF source and at least one of the two antennas. Barrett's scheme clearly generates a helical wavefront from the composite antenna (either right-handed

or left-handed orientations), commonly termed “circular” polarization (either RHCP or LHCP). The relative phase shifts between the two orthogonal waves launched from the orthogonal antennas are controlled by the phase-shifter elements (labeled “ $-\beta$ ” in his Figures 7 and 8) and produce the helically (circularly) polarized waves. Again, Barrett teaches away from standard linear-polarized (“elliptical”) pairs of orthogonally oriented antennas to obtain his desired helical wavefront. In contrast, the instant invention **requires** the use of two time-synchronous (co-phased) orthogonally polarized waves (typically H and V) to achieve the stated benefits of avoiding cancellation of the signal in highly reflective (multipath) environments (see instant ¶¶0042, ¶¶0072, and ¶¶0073). In general, due to the differing reflection coefficients in a high-multipath scenario for the independent H and V waves, at any given point in space, if the H wave has a null, statistically the V wave will not. To exploit this fact, the instant invention requires that the H and V waves be in exact time sync when launched. Barrett, in contrast, teaches away from this condition, instead trying to dynamically change the time (phase) relationship between the two orthogonal waves; this will work properly only in benign, line-of-sight RF paths. The methods of Barrett will in general fail in non-minimum-phase or highly nonlinear-phase paths (e.g., in heavy multipath situations) since the multipath will often scramble the phase of the polarization-versus-carrier phase relationships in the signal of Barrett and the receiver will be unable to correctly resolve the incoming signal phase components. Thus, Barrett’s technique will usually fail in high-multipath and high-noise environments, as opposed to the instant invention, which is expressly designed to provide good signal integrity (i.e., low bit error rates) in such environments. An additional disadvantage of Barrett is the relative frequency sensitivity of his inter-antenna phase shifter, which is a problem in implementing fast frequency-switching systems.

Accordingly, withdrawal of this rejection is respectfully requested.

Claim 11 stands rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) and further in view of Becker (US 6,726,099). As noted, Kostreski and/or Clark do not disclose any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Becker does not obviate this deficiency of Kostreski/Clark.

Becker, et al., U.S. Patent 6,726,099 (hereinafter, Becker) discloses a bidirectional spread-spectrum RFID system using simple frequency hopping on the tag-to-reader RF link and standard direct-sequence spreading on the reader-to-tag transmissions (paragraph 4, lines 45-58; paragraph 6, lines 62-67 through paragraph 7, lines 1-7). The DS and FH modulations of Becker are never used on the same link, and no specific relationship between these component modulations is ever established. Becker never discloses true time-hopping modulation in conjunction with fast frequency hopping, but instead pre-selects frequency channels and time slots for transmissions to minimize mutual interference among tags in his system, although he does disclose an optional pseudorandom selection of his tag transmission time slots. Thus, Becker never discloses the concatenated hybrid spread-spectrum methods of the instant invention, only existing-art spread-spectrum transmission techniques.

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 33-34, 36, 68 and 70-72 stand rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) and further in view of Barrett (US 5,592,177). Claim 33 has been amended to require splitting the hybrid spread spectrum signal into two identical components; and modulating an amplitude of at least one of

the two identical components, wherein each component feeds a separate antenna, wherein the two antennas define an orthogonal polarization.

Kostreski and/or Clark do not disclose any hybrid spread-spectrum (HSS) transmission techniques at all, much less the specific DS/FH technique of the instant invention. Again, Barrett does not obviate this deficiency of Kostreski/Clark. Furthermore, Barrett does not disclose or suggest the limitations of claim 33.

As noted above, Barrett (U. S. Patent No. 5,592,177) actually teaches away from standard linear-polarized ("elliptical") pairs of orthogonally oriented antennas to obtain his desired helical wavefront, instead employing an intervening phase shifter (delay element) between the RF source and at least one of the two antennas. The instant invention, in contrast, uses two orthogonal antennas (see our Figure 11) which use **no** phase shifter but only a standard in-phase ("0°") signal splitter [element 1133 in the dual-polarization HSS transmitter of Fig. 11]. The corresponding receiver of the claimed invention (in Fig. 12, elements 1241 [V] and 1243 [H], feeding the in-phase Combiner) uses a corresponding time-synchronous (in-phase) structure to optimally combine the two independent, linearly polarized H and V channels.

Accordingly, withdrawal of this rejection is respectfully requested.

Claim 35 stands rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) further in view of Barrett (US 5,592,177) and further in view of Swanke (US 5,521,533).

Kostreski, Clark and/or Barrett do not disclose any hybrid spread-spectrum (HSS) transmission techniques at all, much less the specific DS/FH/polarization technique of the instant invention. Swanke does not obviate this deficiency of Kostreski/Clark/Barrett.

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 45 and 58 stand rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) and further in view of Becker (US 6,726,099).

As noted above, Kostreski and/or Clark do not disclose any hybrid spread-spectrum (HSS) transmission techniques at all, much less the specific techniques of the instant invention. Again, Becker does not obviate this deficiency of Kostreski/Clark.

Accordingly, withdrawal of this rejection is respectfully requested.

Claim 52 stands rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Swanke (US 5,521,533).

As repeatedly noted above, Kostreski does not disclose any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Swanke does not obviate this deficiency of Kostreski.

Accordingly, withdrawal of this rejection is respectfully requested.

Claims 56-57 stand rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Barrett (US 5,592,177). Claim 56 has been amended to require splitting the signal into two identical components; and modulating an amplitude of at least one of the two identical components to control a polarization of the signal.

As previously noted, Kostreski does not disclose any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Barrett does not obviate this deficiency of Kostreski. Further, Barrett does not disclose or suggest the limitations of claim 56.

Accordingly, withdrawal of this rejection is respectfully requested.

Claim 69 stands rejected under 35 USC 103 as obvious over Kostreski et al (US 6,005,605) in view of Clark et al (US 2002/0168937) further in view of Barrett (US 5,592,177) and further in view of Becker (US 6,726,099).

As previously noted, Kostreski, Clark and/or Barrett do not disclose any hybrid spread-spectrum (HSS) transmission techniques [i.e., combining DS and FH modulations] at all, much less the specific DS/FFH technique of the instant invention. Becker does not obviate this deficiency of Kostreski/Clark/Barrett.

Accordingly, withdrawal of this rejection is respectfully requested.

Other than as explicitly set forth above, this reply does not include acquiescence to statements in the Office Action. In view of the above, all the claims are considered patentable and allowance of all the claims is respectfully requested. The Examiner is invited to telephone the undersigned (at direct line 928-226-1073) for prompt action in the event any issues remain that prevent the allowance of any pending claims.

In accordance with 37 CFR 1.136(a) pertaining to patent application processing fees, Applicant requests an extension of time from September 28, 2006 to November 28, 2006 in which to respond to the Office Action dated June 28, 2006. A notification of extension of time is filed herewith.

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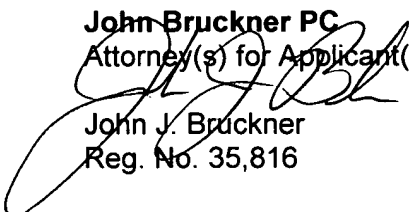
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The Director of the U.S. Patent and Trademark Office is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-3204 of John Bruckner PC.

Respectfully submitted,

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